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APPLICATION FOR LETTERS PATENT FOR:

APPARATUS AND METHOD FOR CLEANING, PAINTING AND/OR
TREATING TRAFFIC BARRIERS

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**APPARATUS AND METHOD FOR CLEANING, PAINTING AND/OR
TREATING TRAFFIC BARRIERS**

BACKGROUND OF THE INVENTION

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1. Field Of The Invention

10 In general, the present invention relates to machines that automatically clean, paint or treat concrete surfaces. More particularly, the present invention relates to mobile machines that clean, paint or treat concrete surfaces as the machine moves along such surfaces.

2. Background of the Invention

15 When roadways are created, it is not uncommon for traffic barriers to be erected between opposing lanes of traffic. There are many different types of traffic barriers. However, the function of most all traffic barriers remains the same. Traffic barriers are used to help keep
20 vehicles in their own lane of traffic and prevent vehicles from inadvertently crossing lanes,

leaving the roadway or otherwise traveling onto an area where vehicles should not travel.

Although traffic barriers come in many different styles and are fabricated from metal, stone, wood and cable, one of the most common types of traffic barrier is the cement traffic barrier. Cement traffic barriers are typically prefabricated in lengths of between four feet and twenty feet. The preformed cement traffic barriers are then transported to a roadway and placed into position with a crane. As such, they can be placed along a roadway quickly and inexpensively.

There are many different manufacturers of cement traffic barriers. As a result, there are many different shapes and styles of cement traffic barriers. Many of these different styles of cement traffic barriers have different methods of interconnecting and different processes for installation. However, most all cement traffic barriers, regardless of the manufacturer, have wide bases that taper upwardly to a narrower top.

This tends to provide the cement traffic barrier with a frustum shaped profile.

5 Cement traffic barriers are commonly used as temporary traffic barriers during roadway construction and maintenance projects. However, due to their low cost and ease of installation, more and more state and local transportation departments are installing cement traffic barriers as permanent structures on the sides of finished
10 roadways. When cement traffic barriers are installed as permanent roadside fixtures, transportation departments typically devise maintenance schedules for maintaining the cement traffic barriers over long periods of time. Such
15 maintenance is to prevent the cement traffic barriers from deteriorating as a result of weathering, contact with vehicles and other forms of damage.

20 A typical maintenance program for cement traffic barriers is to have the traffic barriers periodically inspected and repaired. After

repairs, the cement traffic barriers are often cleaned and painted with either paint or a cement sealant to prevent water from seeping into the interior of the cement traffic barriers.

5 In the prior art, there are many machines used to clean cement structures. Such prior art machines are exemplified by U.S. Patent No. 5,004,156 to Montanier, entitled Washing Device Mounted On A Motor Vehicle And Comprising A Rotary
10 Washing Arm Which Delivers Jets Of Pressurized Hot Water For Cleaning Various Surfaces. Such machines typically include sand blasting heads and power washing heads that are disposed on the end of an articulating arm. The arm can be placed against a
15 wall, traffic barrier, bridge support or any other surface that needs cleaning. Once the surface is cleaned, the cleaned surface is then painted manually.

20 Cement traffic barriers can extend for many miles along the length of a roadway. Using cleaning machines on articulating arms that clean

only small sections at a time are not well suited
for cleaning the full length of many cement
traffic barriers. Furthermore, relying upon manual
labor to hold painting equipment and carry it
5 along the length of the roadway is also highly
labor intensive and inefficient. In fact, it has
been the experience of many municipalities that it
is more cost effective to replace worn and broken
cement traffic barriers after a long period of use
10 than it is to maintain those traffic barriers
indefinitely.

A need therefore exists for an apparatus and
method that can be used to both clean and paint
cement traffic barriers in a cost effective, time
15 efficient and non-labor intensive manner. This
need is met by the present invention as described
and claimed below.

SUMMARY OF THE INVENTION

The present invention is an assembly and method for spraying material on a traffic barrier. The assembly includes at least one vehicle that travels along the length of the traffic barrier while contacting the traffic barrier and being guided by the traffic barrier. With each vehicle is one or more spray head arrays that spray the surfaces of the traffic barrier as the vehicle rolls along the traffic barrier. The spray heads can spray either cleaning material, such as air, water, cleaning solution, solvents and abrasives, or coating materials, such as paint or waterproofing solutions. Both cleaning and coating can be preformed by spray head arrays in the same vehicle or in different vehicles. The spray heads can be automatically adjusted to match variations encountered in the traffic barrier as the spray head arrays are moved along the traffic barrier. In this manner, the quality of the application of sprayed material remains constant despite changes

in the shape, position, orientation and/or
condition of the traffic barrier being sprayed.

BRIEF DESCRIPTION OF THE DRAWINGS

5 For a better understanding of the present
invention, reference is made to the following
description of exemplary embodiments thereof,
considered in conjunction with the accompanying
drawings, in which:

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FIG. 1 is a perspective view of an exemplary
embodiment of the present invention barrier
maintenance assembly;

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FIG. 2 is a schematic illustrating the
components of the embodiment of the barrier
maintenance assembly shown in Fig. 1;

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FIG. 3 is a schematic illustration showing how
guide wheels are initially positioned around a
cement traffic barrier;

FIG. 4 is a schematic illustration showing how
guide wheels contact a cement traffic barrier;

5 FIG. 5 is a schematic showing how spray head
arrays are positioned around a segment of a cement
traffic barrier;

10 FIG. 6 is a side view of an alternate
embodiment of a barrier maintenance assembly.

DETAILED DESCRIPTION OF THE INVENTION

Although the present invention can be used to
clean and/or paint many types of roadside
15 structures, such as metal traffic barriers, stone
traffic barriers and the like, the present
invention is particularly well suited for cleaning
and/or painting cement traffic barriers. As such,
the present invention will be described and
20 illustrated in an application where it is being
used to clean and paint a cement traffic barrier

in order to set forth the best mode contemplated for the invention.

Referring to Fig. 1, there is shown an exemplary embodiment of the present invention barrier maintenance assembly 10. In the shown embodiment the present invention barrier maintenance assembly 10 is configured as a self-propelled vehicle 12. The vehicle 12 is configured so that it can straddle a cement traffic barrier 11 and move along the length of the cement traffic barrier 11 under its own power. As will later be explained in more detail, the barrier maintenance assembly 10 is placed over a cement traffic barrier 11 so that its wheels 14 rest upon the ground on opposite sides of the cement barrier 11. As the barrier maintenance assembly 10 moves along the cement traffic barrier 11, it cleans, paints and/or treats the surfaces of the cement traffic barrier 11.

From Fig. 1, it can be seen that the exemplary vehicle 12 has a frame 16. The frame 16

is configured with a large open center channel 20 that enables the vehicle 12 to be placed over the cement traffic barrier 11 so that the wheels 14 of the vehicle 12 can straddle the concrete traffic barrier 11. The frame 16 has crane hooks 22 that are used to couple the frame 16 of the vehicle 12 to a crane or other overhead lift. As such, through the use of a crane, the vehicle 12 can be placed onto or removed from a length of cement traffic barrier 11 at any point.

At the front of the open channel 20 in the frame 16 is a plurality of guide wheels 24. The guide wheels 24 serve two functions. First, they prevent the frame 16 of the vehicle 12 from contacting the cement traffic barrier 11 as the vehicle 12 rides along the cement traffic barrier 11. Secondly, the guide wheels 24 act as gauges for setting the internal mechanisms of the barrier maintenance assembly 10, as it cleans, paints and/or treats the cement traffic barrier 11.

Refillable storage containers 28 are disposed on the vehicle 12. The storage containers 28 are used to store, paint, waterproofing compounds, cleaning solution or any other product that used to clean, paint and/or treat the cement traffic barrier 11. The storage containers 28 are preferably disposed on the exterior of the vehicle frame 16 so that they can be easily replenished and can be made large to hold a large volume of material.

In the shown embodiment of the barrier maintenance assembly 10, the vehicle 12 is self-propelled. Accordingly, a driver must drive the vehicle 12. A driver cab 32 is therefore provided containing the movement controls of the vehicle 12. Additionally, the operational controls 30 for the mechanisms that clean, paint and/or treat the cement traffic barrier are also disposed in the driver cab 32 so that they can be manually operated.

Referring to Fig. 2, it will be understood that present invention barrier maintenance assembly 10, embodied in the vehicle 12 of Fig. 1 includes at least one of a variety of mechanisms for cleaning, painting and or treating the concrete traffic barrier as the vehicle passes over the concrete traffic barrier. From Fig. 2 it can be seen that at least one spray head array 40 is present within the assembly 10. Each spray head array 40 has spray heads that are pointed toward the channel 20 (Fig. 1) that passes down the center of the vehicle 12 (Fig. 1). As such, when the vehicle straddles a cement traffic barrier and the cement traffic barrier passes through the channel in the center of the vehicle, the spray head arrays 40 are positioned to spray the passing surfaces of the cement traffic barrier.

Each spray head array 40 is coupled to a positional and operational control 42. As indicated by the name, the positional and operational control 42 controls the position of

the various spray heads in each spray head array 40 and the operation of those spray heads.

Each spray head array 40 is coupled to a supply tank 44 and a compressor 46. The compressor 46 supplies compressed air for the spray heads in the spray head array 40. The material in the storage tanks 44 can be sprayed with the compressed air by the spray head arrays 40. The material in the storage tanks 44 depends upon the decided purpose of a particular spray head array 40. For example, if a spray head array 40 is to spray paint onto the surfaces of a passing cement traffic barrier then paint is supplied in the storage tank 44. Similarly, if a waterproofing treatment is to be sprayed on the surfaces of a passing cement traffic barrier then the waterproofing solution is supplied in the storage tank 44. Other materials that can commonly be sprayed may include water, cleaning solution, paint solvent and the like.

Solid material can also be sprayed by one or all of the spray head arrays 40. A spray head array 40 can be configured so that it sprays sand against the surfaces of a passing cement traffic barrier. In such a sandblasting process, naturally
5 sand or a similar abrasive would be supplied in the supply tank 44 of the spray head array 40.

The supply tank 44 of a particular spray head array 40 can also be isolated from that spray head array 40. In such a configuration, just compressed
10 air is sprayed by the spray heads in the spray head array 40. Such a spray configuration can be used to air blast clean the surfaces of the passing cement traffic barrier.

In the shown embodiment, there is a plurality of different spray head arrays 40. Each spray head array 40 can have the same or different function. For instance, a first spray head array can be used to air blast the surfaces of a cement traffic
15 barrier while a second and third spray head array
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spray coating of paint onto the cement traffic barrier.

In Fig. 2, it can be seen that an optional mechanical cleaning mechanism 48 can be placed in front of the first spray head array 40. The mechanical cleaning mechanism 48 can be a series of spinning brushes, spinning chains or any other cleaning mechanism that physically contacts the surfaces of the cement traffic barrier to dislodge dirt, grime, old paint or other accumulated debris. If a mechanical cleaning mechanism 48 is present, it too is provided with a positional and operational control 49 that is used to control the position and operation of the mechanism.

The positional and operational controls 42, 49 of the various spray head arrays 40 and the mechanical cleaning mechanism 48 are coupled to the manual control panel 30 of the barrier maintenance assembly 10 so that they can be manually controlled by an operator. Furthermore, the guide wheels 24 are used to either

mechanically or electronically provide information that is used to set the various positional and operational controls 42, 49. The guide wheels 24 roll along the surfaces of the passing cement barrier structure. The guide wheels 24 contact the surfaces of the cement traffic barrier. As such, the guide wheels 24 physically detect the dimensions of the cement traffic barrier and can detect when the shape, size or position of the cement traffic barrier changes as it passes into the barrier maintenance assembly 10.

Referring to Fig. 3, it can be seen that when the barrier maintenance assembly 10 is first placed over a cement traffic barrier 11, the guide wheels 24 are retracted and do not contact the cement traffic barrier 11. Referring to Fig. 2, it can be seen that once the barrier maintenance assembly 10 is in place, the guide wheels 24 are brought into contact with at least some of the various surfaces of the cement traffic barrier 11. In Fig. 4, a plurality of guide wheels 24 are

used. By bringing the guide wheels 24 into contact with the surfaces of the cement traffic barrier 11, it can be seen that the cross-sectional shape of the cement traffic barrier 11 can be determined including its height, width and angle of taper.

Once the guide wheels 24 are brought into contact with the surfaces of the cement traffic barrier 11, the dimensions obtained from the position of the guide wheels 24 can be transferred either manually, physically or electronically to the positional and operational controls 42 (Fig. 2) of the spray head arrays 40 (Fig. 2) and the positional and operational controls 49 (Fig. 2) of the mechanical cleaning mechanism 48 (Fig. 2).

Referring to Fig. 5, it can be seen that the various spray heads 41 in a spray head array 40 can be positioned with information received from the guide wheels 24 (Fig. 4) to properly spray the passing cement traffic barrier 11. Since the guide wheels constantly detect changes in the shape of the passing concrete traffic barrier 11 the spray

heads 41 can also be constantly adjusted to ensure that the application quality of the material being sprayed remains relatively constant.

Returning to Fig. 2, it can be seen that since the barrier maintenance assembly 10 is embodied as a vehicle 12, the assembly 10 includes an engine 50 for propelling the vehicle 12. The engine 50 is also used to drive the compressor 46 that supplies compressed air to the various spray head arrays 40. The engine 50 drives at least two of the wheels 14 of the vehicle 12 to propel the vehicle 12. The vehicle 12 is manually driven and has a transmission designed to propel the vehicle 12 along a length of cement traffic barrier 11 at a speed of between two miles per hour and ten miles per hour.

A suspension adjustment mechanism 52 may also be provided. The suspension adjustment mechanism 52 is manually controlled and controls the height of the vehicle frame above the ground. Different types of cement traffic barriers vary greatly in

height. Some stand slightly larger than curbs.
Some can stand five feet tall. The use of the
suspension adjustment mechanism allows an operator
to set the general height of the barrier
5 maintenance assembly 10 so that it is properly
positioned for the height of the cement traffic
barrier being maintained. Small variation in the
size and height of the cement traffic barrier are
not compensated for with the suspension adjustment
10 mechanism, but are rather adjusted by using the
positional and operational controls of the various
spray head arrays 40.

In the embodiment of the present invention
barrier maintenance assembly 10 shown in Fig. 1
15 and Fig. 2, the barrier maintenance assembly 10
has multiple spray head arrays in a single
machine. Such an embodiment is merely exemplary
and it should be understood that barrier
maintenance assemblies can be made containing only
20 one or two spray head arrays. Such an embodiment
is set forth in Fig. 6. In Fig. 6 it can be seen

that the barrier maintenance assembly 60 is
divided into different dedicated vehicles. In the
shown embodiment, there is a cleaning vehicle 62.
The cleaning vehicle 62 may contain spray heads
5 that air blast the cement traffic barrier or spray
heads that spray water and cleaner against the
cement traffic barriers. A separate vehicle can be
constructed as a painting vehicle 64. The painting
vehicle 64 contains spray head arrays that spray
10 paint or waterproofing treatment onto the concrete
traffic barrier 11.

Each vehicle 62, 64 contains the guide wheels
and adjustment mechanisms previously described.
Each of the vehicles 62, 64 can contain an engine
15 and can be self-propelling. However, each vehicle
62, 64 can be made simply to be free rolling. A
single self-powered vehicle 66 can then be
provided to pull the various free rolling vehicles
62, 64. Units can be pulled one at a time or can
20 be coupled together like freight cars of a train.
In the shown embodiment, the self-powered vehicle

66 is shown as a dedicated machine that straddles the cement traffic barrier 11. However, the self-powered vehicle 66 can be an ordinary truck that pulls the free-rolling vehicles 62, 64 by driving along the side of the cement traffic barrier.

It will be understood that the embodiments of the present invention barrier maintenance system that are described and illustrated herein are merely exemplary and a person skilled in the art can make many variations to the embodiment shown without departing from the scope of the present invention. All such variations, modifications and alternate embodiments are intended to be included within the scope of the present invention as defined by the appended claims.